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GOOD LIGHTING
LIGHT LAMPS FITTINGS AND ILLUMINATION
OIL · GAS · ELECTRICITY ACETYLENE PETROL-AIR GAS ETC.
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Association of Public Lighting Engineers

NINTH ANNUAL MEETING AND CONFERENCE IN BLACKPOOL.

IN our last issue we reproduced the provisional programme of the above Conference, which takes place in Blackpool during September 5th-8th.

The Conference promises to be quite as successful as in previous years, and we understand that the attendance is likely to be a record. The series of papers dealing with the lighting of Burnley, Colchester and Oldham will be supplemented by data in regard to Chesterfield by Mr. Harold Davies, who this year assumes the Presidency. The contributions illustrating the application of the Standard Specification for Street Lighting should prove of permanent value long after the Conference is over. We believe that the authors responsible, Mr. F. C. Smith and Mr. G. H. Wilson, have set about their tasks very seriously indeed and prepared something quite out of the common. Of special interest also is Councillor R. H. Minshall's address on "The Administration of Public Lighting," which we hope will carry conviction to those cities who have not even yet accepted the necessity of appointing a fully qualified and independent engineer to control the lighting of their streets. The Annual Report, which the Hon. Editor of the Association (Mr. E. J. Stewart) has prepared, again contains an informative survey of public lighting developments within the British Isles.

Another feature of interest in Blackpool will be the Exhibition of Lamps and Lighting Equipment. The fact that 26 exhibitors, including all the leading firms interested in public lighting, are taking space is an indication of the popularity of the Conference as well as of the vitality of the lighting industry during what is generally regarded as a period of trade depression. We hope that all visitors will make a special study of the Exhibition, catalogues of which are being prepared (for the first time this year).

It is an encouraging sign to find this Conference being carried through, doubtless quite as successfully as in previous years, despite the general tendency to economy (sometimes carried to injudicious extremes). We trust that it will have a beneficial influence in encouraging local authorities to proceed with new lighting schemes in circumstances where they are badly needed.

Finally we may add that Blackpool is a delightful meeting place so that, granted fine weather, the visit should prove agreeable as well as informative.

Illumination in Industry

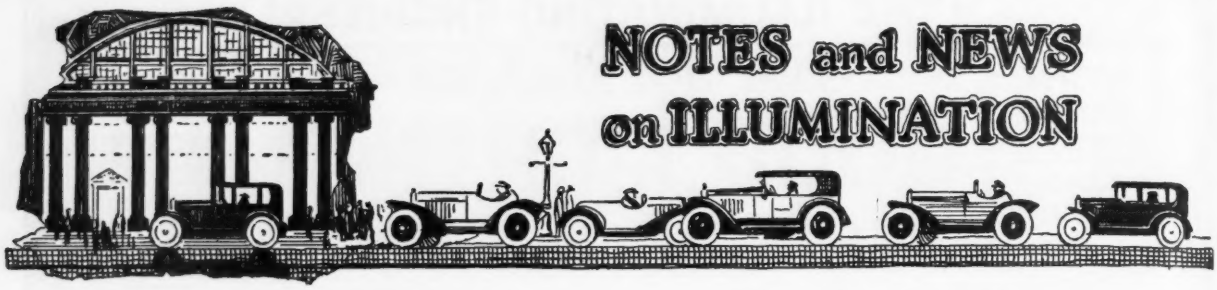
WE record with pleasure the presentation of a paper on the above subject by Mr. W. J. Jones at the recent Congress of the Royal Sanitary Institute, in Brighton. We have several times lamented in past years the fact that no paper emphasizing the importance of good lighting in relation to health had been read at this annual Congress. On this occasion, however, Mr. Jones stepped into the breach, and advantage was thus taken of a useful opportunity for propaganda. Amongst others who were present at Brighton, and joined in the discussion of the paper, were Mr. E. L. Oughton and Dr. E. H. T. Nash, both of whom had been colleagues of the author on the I.E.S. School-lighting Committee.

In dealing with the partnership of light and vision, Mr. Jones recalled a conclusion that deserves to be more widely known—that formed by Hartridge and Lythgoe, who found that a hundredfold increase in illumination may have the approximate effect of doubling the resolving power of the eye. These investigators have suggested that 100-120 foot-candles is necessary for maximum acuteness of vision, and there are doubtless some processes involving very fine work where any possible gain in this respect is an advantage.

It was pointed out that at the present time we can get, for a given expenditure, nearly three times as much light as in 1922. Consumers, therefore, can afford to take a confident step forward towards higher efficiency. Mr. Jones also discussed the avoidance of glare and harsh shadows and the psychological value of good lighting. He quoted statistics obtained by inspectors of factories to show the high percentages of shops where values of illumination below 5 foot-candles are still found. The data recently compiled by Mr. Shopland, and summarized elsewhere in this issue (see pp. 213-215), again confirm this conclusion in other fields.

The "frequency of occurrence" curves show the low values of illumination still met with in many factories, and the tables bearing on glare reveal only too clearly that in many cases where more light is being used it is not being applied to the best advantage. We fear that the same applies to many other buildings, including schools and offices.

Mr. Jones concluded by expressing the hope that the conference would take every opportunity of stressing the importance of industrial lighting in connection with industrial hygiene. We hope that there will be renewed opportunities for them to do so in coming years.



Illumination Photometers based on Photo-Electric Methods

For some years the value of the photo-electric cell in photometry has become increasingly recognized. Such " physical " methods have proved their value in the laboratory, where they are now quite widely used. It is, however, a long step from this point to the realization of a conception dating from the commencement of illuminating engineering—the production of a direct-reading illumination photometer based on physical methods. Such an instrument would eliminate, for the user, the need for balancing brightness, as in the case of an ordinary photometer. This balancing process would have to be undertaken only by the skilled expert who calibrated the instrument. An observer using such a physical photometer would merely place it on the spot where a measurement of illumination is to be made and observe the reading of a pointer on a scale. It now appears that the problem of producing such an instrument has been substantially solved. There are now in existence at least two such instruments. Apparatus of this kind will be on view at the exhibition to be held in connection with the Conference of the Association of Public Lighting Engineers being held at Blackpool during September 5th to 8th. Similar instruments will, it is hoped, be shown at the opening meeting of the Illuminating Engineering Society next October. We have ourselves had an opportunity of witnessing the use of one instrument which appears delightfully simple to operate. This is based on the use of a photo-electric cell which, when exposed to light, generates a current sufficient to operate a portable galvanometer. We must leave to experts the demonstration of the manner in which the various difficulties incidental to the use of photo-electric cells in place of the human eye have been overcome.

The Ettles Lecture

We learn that Sir Francis Goodenough has been invited by the Institute of Ophthalmic Opticians to deliver the annual Ettles lecture, on October 6th. Members of the Illuminating Engineering Society will be gratified to learn that their President has thus been honoured. The lecture will doubtless afford an opportunity of dwelling on the importance of good illumination in the interests of vision, and on the help that opticians can render—not merely by using their professional influence in favour of better lighting, but by themselves studying the subject. There are a number of stubborn problems which they might help to solve, such as the devising of a simple test of glare and the furnishing of scientific data confirming the widespread belief that inadequate lighting conditions must, in the long run, have prejudicial effects on the eye. Dr. W. Ettles, in whose memory this lecture was initiated, was one of the first ophthalmic surgeons to take a keen interest in illumination. He took part in many early discussions of the Illuminating Engineering Society, and was a member of the original joint committee on school lighting, whose report has recently been the subject of revision.

Two More Tube Stations

During recent months visitors to Hyde Park must have noticed with some curiosity the excavations proceeding at either end, at Hyde Park Corner and at Marble Arch, where new Tube Stations have been in course of construction. At the moment of writing the lighting of the former has been completed, and the lighting of the latter, which has now been opened to the public, very nearly so. At Hyde Park Corner, where the full lighting is in operation, the result is exceedingly effective. The use of a luminous diffusing glass surround to the concours, and the assembly of a luminous system built up round the entrance stairs are both well conceived.

The available illumination must be quite high, and even during the bright sunshine of August the effect was striking. It should be still more so during the dark and wet months of winter. The Tube engineers certainly deserve credit for the way in which they have seized the opportunity to apply the very latest methods in the lighting of these stations, and for the fact that light has been furnished on a generous scale. We are confident that this is the right policy.

Public Works, Roads and Transport Congress

PAPERS COMPETITION, 1933.

The Organizing Committee of the above Congress has decided to offer prizes for papers submitted in connection with the Congress to be held in November, 1933. The first prize is a gold medal and 100 guineas, the second prize a silver medal and 50 guineas, and the third prize a bronze medal and 20 guineas. There is also a fourth prize of 10 guineas, and an additional award of five guineas for each other paper selected for discussion. All papers for the competition must be received by December 31st, 1932, by the Hon. Secretary of the Congress (84, Eccleston Square, London S.W.1), from whom fuller particulars of the competition may be obtained. The announcement contains as an appendix a list of suggestions for subjects of papers. It would appear that a paper on public lighting would have to fall either in the Gas Supply or the Electricity Supply sections, and would thus have to deal exclusively with lighting by one or other illuminants rather than with lighting in general. It would surely be unfortunate if contributions on public lighting were thus limited, but possibly, as the list of subjects is entitled " Suggestions," a broader treatment of the subject is not excluded.

The Artificial Lighting of Libraries

We learn that a paper on the above subject is to be presented by Mr. H. Lingard before the Congress of the Library Association, on September 5th. Mr. Lingard, it may be recalled, served on the joint committee formed by the Illuminating Engineering Society to consider this subject which reported last year. One is glad to note this further effort to interest librarians in the lighting of buildings under their charge.

Some Observations on Artificial Lighting in Factories

IT will be recalled that, at a special meeting of the Illuminating Engineering Society held in Birmingham on March 14th in the present year, an informative survey of lighting conditions in certain factories was presented by Mr. P. E. Shopland (H.M. Inspector of Factories).* That survey dealt mainly with the light engineering and electrical trades. We have now been afforded an opportunity of studying a somewhat fuller report also prepared by Mr. Shopland dealing with a greater variety of processes.

In all 213 factories were visited in various parts of England and Scotland. The report covers foundries, engineering and certain allied trades such as lace-making, embroidery making, artificial silk making, etc. The manner in which the figures are assembled facilitates comparison with those in the First Report of the Departmental Committee on Lighting in Factories and Workshops (summarizing results of tests conducted in 1913-14) and enables one to judge in some degree how much improvement has subsequently occurred. Unfortunately, it appears, the degree of improvement is not great.

The industries inspected are shown in Table I. Table II illustrates conditions of glare. Records of the illumination in foot-candles are presented in tabular form in the original report. From the latter data Mr. Shopland also prepared "frequency of occurrence" curves, the median of which shows the point above which and below which there is an equal number of observations. Some of these curves, with the median points, are here reproduced. The fixation of a median in this way is a useful means of gauging the general order of illumination in any particular class of factory.

TABLE I.

Industry	Number of factories visited	Number of factories in which photometric readings were taken
Iron-founding	74	71
Engineering	93	36
Lace-making	33	19
Embroidery	1	1
Artificial silk knitting	1	1
Worsted weaving	3	3
Cotton spinning	5	2
Cotton weaving	2	2
Tailoring	1	1
Total	213	136

Total number of photometric readings taken :—1,310.

TABLE II.

Number of factories in which			
Glare is absent	Glare is due to a small number of sources only	Glare is bad	Glare is very bad
26	59	67	61

Iron Foundries.—Observations were taken in 71 foundries. Besides electric lighting and, to some extent, gas lighting, candles and paraffin duck lamps are occasionally found. A prevalent defect is the use of high wattage lamps in shallow reflectors, such as expose the filament to view, causing glare and wasting light (as the illumination at working level is naturally less than it would be with a properly designed reflector). Even 500 and 1,000-watt lamps are frequently found unshaded. In many such cases occupiers, who judge illumination by looking at the bright lamps, believe that their premises are well lighted and learn with surprise that the conditions are deplorable.

Throughout this industry a very low order of illumination was found. 31 per cent. of readings do not exceed 1 ft.-c.; 55 per cent. are below 1·6 ft.-c.; 75 per cent. do not exceed 2 ft.-c.: only 11 per cent. show 5 ft.-c. and above. The median of the frequency of occurrence curve occurs at 1·8 ft.-c., the curve then dropping rapidly and showing that few places receive more than 2·5 ft.-c. Many complaints of poor lighting were received from operators, chiefly moulders who regarded it as a cause of eyestrain and defective vision and also as causing backache because the head had to be kept lower and nearer the floor in the effort to see.

In foundries handling large and heavy work, lighting units 28 ft. to 30 ft. above the floor are frequently found. Dispersive types of reflectors are often used where concentrating units, with close spacing, are desirable. Owing to the presence of travelling cranes this great height is often necessary and troublesome shadows are thus liable to be cast by the moving machinery. This difficulty may be overcome by attaching below each crane a light source which travels with it; or by supplementing the overhead lighting by bracket lights and angle-reflectors. Unfortunately many such lamps are equipped with tilted shallow conical shades and as clear bulb lamps of 200 or even 500 watts are frequently thus used the glare is sometimes considerable.

In many foundries cleaning is only done annually, e.g., at the commencement of each winter. Great efforts have been made to induce occupiers to have the fittings cleaned more frequently; it has been demonstrated to them by photometric tests that illumination may thus be increased by 50 to 100 per cent. One large foundry which had replaced all 500-watt lamps by 1,000-watt lamps in modern reflectors was found. The floor illumination in this case was 8 ft.-c. Everyone expressed great satisfaction in the improved conditions, which were considered well worth the expenditure incurred. From experience in the very few foundries where good illumination was provided it has been concluded that at least 5 ft.-c. should be provided in a new installation; even so a depreciation of 20 per cent. and a rapid fall to 4 ft.-c. may be expected in this industry.

Engineering.—In this industry general (direct) lighting is in use for assembling and machine work, but is usually supplemented by local lighting for fine work or bench operations. The probability of shadows being caused by belts and machinery, and the available illumination from overhead lighting thus much diminished, renders such local lighting desirable.

Here again glare is frequent, especially from sources of light mounted only 11 to 15 ft. from the floor and furnished with old-fashioned shallow reflectors. Not infrequently bare 40, 60 or 100-watt lamps are found in use for local lighting—sometimes covered with paper by the operator in order to reduce glare! Local sources should always be completely screened from the eyes of workers and as a rule they should be capable of adjustment so that the light can be directed at the desired angle. Elbow brackets are thus desirable, though in practice one finds that local units are frequently of the pendant type (vertical adjustments

* *Illum. Eng.*, May, 1932, pp. 129-132.

being then made either by looping the lead through two holes in a piece of wood, or by knotting; and horizontal adjustments by tying the source in the most suitable position by pieces of string!). In such cases the lamp must hang vertically, and this in itself renders it difficult to direct the light to the best advantage.

The cleaning of fittings in engineering factories is apt to receive little attention, reflectors being often found in such a state that their value as reflecting surfaces is negligible. Attention is also drawn by Mr. Shopland to the unsatisfactory results attending the use of inferior lamps of foreign manufacture. Instances are mentioned where the efficiency (candle-power per watt) was 70–80 per cent. and in a few instances only 66·5 per cent. of that furnished by similar lamps of British manufacture. In one factory visited 300,000 units at 0·82d. per unit are used annually for power and lighting, about 21 per cent. of the load being for lighting only. Whole-time employment is provided for one man in cleaning the lighting fittings and replacing fittings and lamps, at an estimated cost of 6d. per light-point per annum. This enables each fitting to be washed, on the average, twice a year.

The frequency of occurrence curve for fine turning shows a median of 7·8 ft.-c., but the shape of the curve shows a tendency for the illumination to be higher in many factories. When conveniently adjustable fittings are available for this process and others of a similarly fine character, it is found that operators will adjust the fitting to give between 15 and 25 ft.-c.

The curve for fitting and assembling shows a median of 5·4 ft.-c. This is a reasonably good standard, but a somewhat higher value, 6–8 ft.-c., is recommended.

A curve for general illumination at table-level where processes not of a very fine character are undertaken was also prepared. In this case the median is located at 2·7 ft.-c., and it is evident that in many works the illumination is very much lower than this. The spacing of light-points is usually too great, giving rise to very uneven illumination. An average illumination of 5 ft.-c. is recommended.

Mr. Shopland suggests that the lighting of drawing offices by general methods alone is not satisfactory, owing to the impossibility of preventing shadows of the body of the draughtsman when bending over his work and using his instruments at different angles. It is considered that each drawing and tracing board should be provided with a good type of adjustable unit, equipped with suitably designed reflectors to eliminate glare and enabling each draughtsman to regulate the position of his light-source and to vary the available illumination according to his needs. Local units of this character should be supplemented by reasonable general lighting. The frequency of occurrence curve in this case shows a median of 8·4 ft.-c.

Lace-making.—This industry may be divided into several divisions, but the lighting problems are substantially the same in each case and the methods are similar. Good lighting from the front of each machine is essential in order to enable operators to pick up and repair broken threads quickly. Local lighting is almost universal and in at least 70 per cent. of cases lamps are bare and unmounted at a low level situated near eye-level, thus causing much glare. Two, three or, in exceptional cases, five light-sources are provided over the front of each machine, which is about 18 ft. long. A common defect is the absence of suitable shields or reflectors which, if interposed between the sources and the eye, would enable the work at the top and front of the machine to be seen with ease. Provision is, however, rarely made to allow the sources to be adjusted sufficiently close to the material at the lower part of the front of the machine. To enable work in that region to be examined operators commonly use candles or electric torches (supplying both at their own expense!). The use of candles is regarded as dangerous as the naked light has to be placed so near to the material to enable defects to be seen.

In some instances a pair of machines, facing each other, is illuminated by a row of three to five sources suspended between them, all lamps being bare. The operator views his work by pulling over to his machine whichever light seems suitable. This, however, only allows him to see the area in the vicinity of the facing bar, which is at about eye-level, and gives him no opportunity of viewing the lower part of the front of the machine. Occasionally the facing bar is blackened so as to provide a contrast with the white material passing over it, but the black paint is apt to be rubbed off by the constant friction of passing lace, and it is not too frequently renewed. Where artificial silk was being used in these machines the best illumination for discovering defects was obtained by adjusting the sources so that the angles of incidence and reflection were as low as possible; in fact the rays should be almost in the same plane as the material passing in front of the machine; otherwise owing to the transparency of the material it was impossible to detect broken threads.

The median obtained from the frequency of occurrence curve for this process shows 6·6 ft.-c., which is considered far too low. Many complaints were made regarding the bad conditions of illumination where illumination up to 8 ft.-c. was provided. It is considered that at least 12 ft.-c. and preferably 15 should be provided along the front of each machine. This illumination should be furnished by means of well-shielded sources adjustable by the use of elbow brackets, three being provided to each machine, with one or two general light-sources of low candle-power to illuminate the gangways.

Comparisons with 1913–14.—In the concluding portions of his report Mr. Shopland compares certain series of results with corresponding records obtained in 1913–14, prior to the issue of the report of the departmental committee on factory lighting. Generally speaking, the impression received is that where advances have occurred they are due more to the advance made in illuminants than to any endeavour to improve the layout of the installation. In fact, in most cases, the positions of light-sources are the same as originally. Hence, as appears from the accompanying curves, quite inadequate values of illumination are found in most cases.

The position in regard to glare is illustrated in Table II. Of the factories visited during the winter only 11·7 per cent. were regarded as free from glare, in 31·6 per cent. the glare was bad and in 28·7 per cent. very bad indeed. The total of the last two percentages shows an improvement of 10 per cent. over last year's records, but the percentage of factories in which this wasteful and harmful effect exists is still very large.

The most hopeful sign is that, in spite of the present bad conditions, consumers seem anxious to learn. Mr. Shopland reports that each year he finds greater interest shown in the subject of lighting and that every assistance has been rendered by works officials in connection with his enquiry. Every effort has been made to persuade occupiers either to provide suitable modern reflectors or, where they have been reluctant to

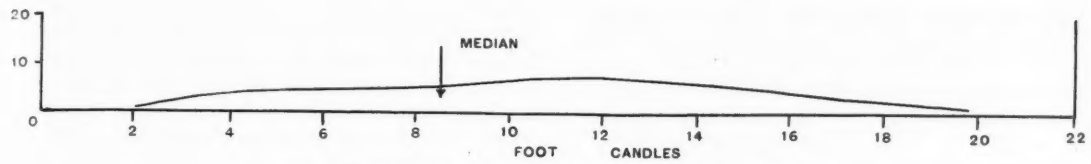


FIG. 1.—Engineering Drawing Office. (62 Readings from 14 Offices.)

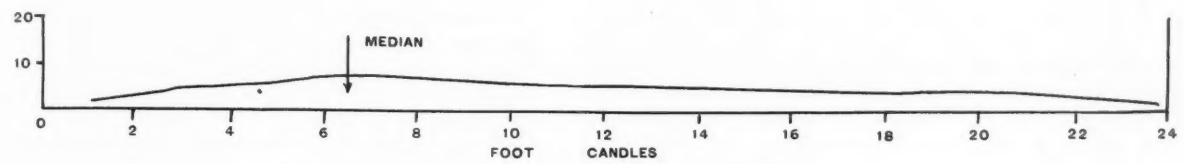


FIG. 2.—Lace Weaving. (106 Readings from 19 Factories.)

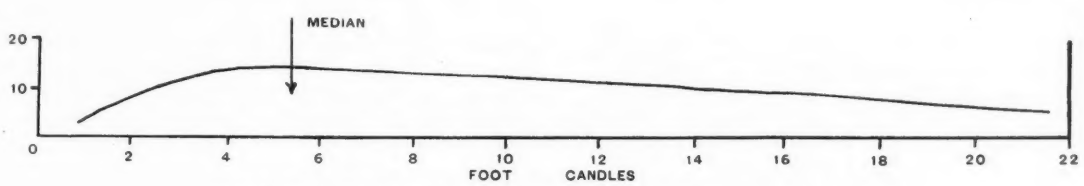


FIG. 3.—Engineering—Fitting and Assembling. (211 Readings from 36 Factories.)

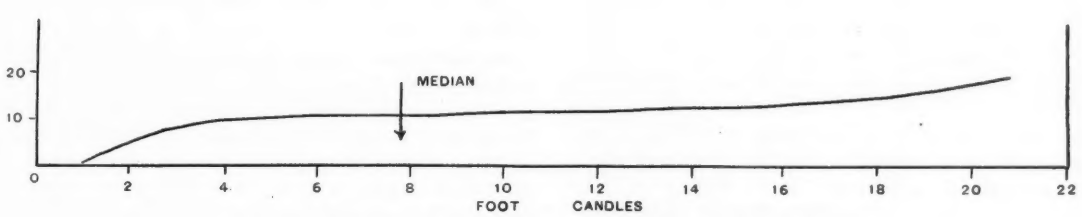


FIG. 4.—Engineering—Fine Turning. (214 Readings from 47 Factories.)

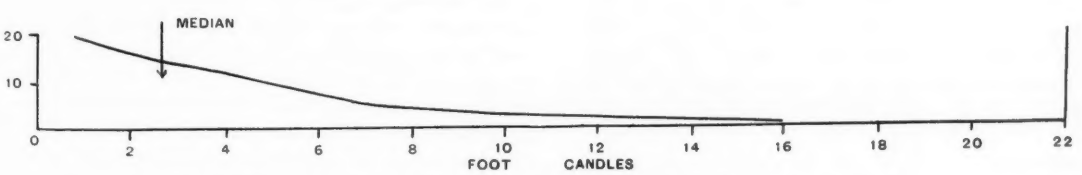


FIG. 5.—Engineering—General Illumination at 3-ft. level. (162 Readings from 32 Factories.)

"Frequency of Occurrence" Curves for various factories, as prepared from data assembled by Mr. P. E. Shopland

purchase new fittings at the present moment, to suggest methods whereby the present lighting conditions can be improved at low cost.

We reproduce some of the "frequency of occurrence" curves prepared by Mr. Shopland as the result of his visits to various types of factories. The curves show interesting variations in shape. It will be observed that, with the exception of fine turning (for which local lighting is doubtless largely used) values of the order of 20 foot-candles are only very occasionally found.

Tungsten Filament Electric Lamps

(BRITISH STANDARD SPECIFICATION NO. 161, 1932.)

The above specification (superseding No. 161, 1930) has recently been issued by the British Standards Institution (28, Victoria Street, London, S.W.1), from whom copies (post free, 5s. 4d.) may be obtained. During recent years this specification has progressively become more detailed and complete. The copy now issued, bound in stiff cover, is a very conveniently assembled and useful production.

The Art of the British Decorator

By AN ENGINEERING CORRESPONDENT

THE importance of adequate, well-directed, light for the enhancement of the design material, texture and colour of structures has been acknowledged from the earliest times. It is therefore not surprising that in these days decorators recognize the valuable addition suitable light-sources can be, both during daylight and after dark, in improving the surprisingly large variety of materials now embodied in their work. The floodlighting of the best buildings in London and other important cities during the recent International Illumination Congress has accentuated interest not merely in exterior effects but also in the enlivening and beautifying interiors of residences and places of business. Illuminating engineers will therefore no doubt feel gratified that Sir Francis Goodenough should be able, during his presidency of the Illuminating Society, to open the Conference of the Incorporated Institute of British Decorators held at the old City Guildhouse, Painters' Hall, from July 20th to 23rd last.

Business methods were the keynote of the Conference. The description of the programme as a "non-stop" one by Mr. Henry G. Dowling, the President of the Institute, was apt. During the three-day period eleven papers were presented at the morning sessions, while the afternoons were filled with visits.

Sir Francis Goodenough, in his opening address, pointed out that the Institute was concerned with the association of beauty and harmony with duty in such a manner as would make the home a place of peace and rest and happiness, while in industrial premises it sought to create a background for the carrying on of business and co-operation in work which would make those who entered such premises glad to be there. He said the decorator had a fine profession, and a great ideal, in being able to create harmony in all buildings occupied by mankind and in pursuit of this would render great service to the community. He had, moreover, found that the education authorities were ready and willing to do their part in fitting people for life and livelihood.

Mr. Wm. A. Kimble, of New York, of the American Decorators' Institute, felt that decorators here had probably the same problem to encounter as in his country, namely, that many unqualified persons presented themselves and by "face," or social position, easily secured work for which real decorators had to strive. Some difficulty had been experienced from those architects who considered the decorator's craft superfluous.

"The Art Education of a Decorator" was the subject of Mr. E. M. O'Rorke Dickey's paper, which summarized what was being done in secondary schools, a subject on which the author, as a Staff Inspector to the Board of Education and from his work as a painter and author, had intimate knowledge. Sir Charles C. Allom, forcefully dealing with the subject of "The Value of Tradition in Artistic Training and the Dangers of Modernism in Art," said there were too many freaks in all branches of art and that even the walls of the Royal Academy exhibited works that were the product of bad teaching and perverted taste. Professors of art had preached much of originality but had produced little to be proud of. Modernism recognizing no laws had no ideals and no standards but still was not wholly bad. It would be time to despair of modernism when men proved the honesty of their views by seeking wives modelled on the distorted lines of some of their pictures and sculptures!

"Colour in Interior Decoration" formed the subject of the discourse, illustrated by diagrams, given by Mr. E. Hesketh Hubbard, a painter, etcher and writer of distinction and founder of the Print Society. Mr. C. L. Stocks, Assistant Secretary to the Treasury, keenly alert to the position which the artist should take in industry, dealt with "The Practical Steps Required to make British Industrial Art Pre-eminent," and pointed out among other things the value of securing the interest of a very rich man to support the movement, which was a fully justified one.

The first communication on the second day was that on "Modern French Decoration," by Miss M. Harris. This was followed by Mr. G. M. Boumphrey's discussion of "The Aims and Methods of Modern Decoration," which might be regarded as a defence erected against the attack by Sir Chas. Allom on the previous day. The lecturer said that modernism had received a bad name and was often confused with Bolshevism, cubism, atheism and even immorality. Nevertheless, he considered it was based on common sense and simplicity and combined beauty with efficiency and sincerity. The world we now lived in was full of ugly sights and rapidly moving bodies accompanied by jarring noises, roars, rattles and screams. Since we were continuously being jolted and bumped, we had need for restful surroundings in our homes. Supplementary to the resultant need for simplicity was the urge for economy. He conceived it might be possible that the horrid practice of dressing steel structures with hypocritical stone might be abandoned, and urged that genuine simplicity was more permanently satisfying and beautiful than complexity, a statement borne out by most modern lighting fixtures.

A vivid review of the position of the decorator was limned by Mr. J. Betjeman, who said he was tired of people who decorated the interior of their houses in "Mayfair-Ecclesiastical-Spanish," or "South Kensington-Monumental-Queen Anne." He admitted yawning when an architect said "I can run you up something in Tudor antique or jazz modern just as well." Decoration was wrong unless it meant the same as build, for architecture and decoration were inseparable. This unity was generally maintained up to 1830, since when division almost universally took place and decoration was regarded as an afterthought to suit the taste of the client. Since the time of Repton, who enunciated over 100 years ago "what is not pleasing to the mind is not pleasing to the eye," the average man had become so blinded by the artistic blunders of several decades that the word "modern" now often signified "ugly." He envisaged with the increase of transport and the spread of knowledge, the universality of many materials would cause Europe to have the same style and county and country individuality would be wiped out. The motor-car had become more important than the house, petrol than the picture. Our homes were being levelled down to places where we slept and rarely read or sat. This spirited contribution was followed by a constructive one on "The Decoration Value of Good Lettering," by Mr. G. Mansell, and, like the former paper, was well illustrated by lantern slides. The practical value of good lettering was well demonstrated by a comparison of photographs of the recent street-crossing signs. The detrimental effect of projecting signs in large office buildings was the result of no standard suitable design of door existing to which the user's name and occupation could be attached at a convenient height. Improved group signboards with interchangeable designation strips, now being introduced into new office buildings were, in the

author's mind, the best way of preserving the amenities of the structure. Suitable type forms were also discussed from the aspect of their legibility, and it was laid down as an axiom that the true effect of an inscription could only be gleaned from either a full-scale or a complete reduced scale model or drawing.

The proceedings on the third day were commenced by a paper nominally on "Hotel Decoration," which pointed out that the English people were getting more and more into the habit of using hotels, and that there was much leeway to be made up before English hotels could compare with Continental and American ones. The cruises now conducted by the great steamship owners brought many visitors to this country, and it was necessary that while preserving our characteristic styles there should be an abolition of such obsolete things as the wash-hand stand and the small can of water in the bedroom, not to speak of the old, stereotyped meals. In this connection the good work done by the Trust Houses was quoted. The author who was responsible for the decoration of the "Georgic," in which he had just returned from its maiden voyage to America, showed views of the lighting equipment of that and other of the palatial vessels now in regular public service that could well form the groundwork of a discussion on "Ship Lighting" by the Illuminating Engineering Society. "The Use of Wood for Interior Decoration" was dealt with by Mr. C. A. Richter, who holds sane views on the relationship of Art to Industry. A valuable contribution of great value to the specialist woodworker.

The appreciation of correct and adequate illumination by "Decorators" was illustrated by the interest shown in Mr. Herbert C. Pride's paper dealing with the "Part of Lighting in Interior Decoration." The author pointed out that, apart from its importance in decoration, artificial illumination played a very essential and cheery part after nature had switched off its supply of sunlight. As a producer of modern lighting fittings he was prepared to admit that in the early stages they often were very crude, but any departure from the traditional was at its inception rather terrifying. Realizing, with a few others, the great possibilities, and knowing someone must take the blame and "get busy" with novelties, the author had during the last four years put his ideas into concrete form. In doing so he had the co-operation of artists and designers trained in the potentialities and sympathetic to the harmonious blending of glass with other materials.

The results could be seen in many cinemas, and by their originality, and suitability to their environment, not only created interest in surroundings but also gave the trades connected with decoration opportunity and scope for development and originality in design, with occasion for large-scale experimenting in decorative illumination. The same problems of brilliant and pleasant lighting effects, whether from laylights or glass fitments, were present in the entrance halls, vestibules and foyers of both cinemas and hotels, namely, the production of brightness as a constituent part of an attractive decorative scheme. Foyers and vestibules, requiring less brilliant effect are often suitably lighted by semi-concealed cornice illumination or by floodlighting emitted from opaque or semi-transparent wall brackets. The question of the colour of the illuminant was of importance and, although it might generally be stated a pale flame colour improved the effect, care had to be taken with the introduction of colour not to disturb the decorative scheme, particularly where pale colours came into consideration.

The interior of the cinema offers almost unbounded scope for the illuminating engineer, who among many other considerations must bear in mind not only the cost but also the maintenance outlays. The use of semi-concealed light-sources, especially where the lamp spacing is correct, whether from cornice, recess or extended ceiling mouldings, is highly effective, but in many instances the cost of maintenance involved in glass panels is apt to be excessive.

The introduction of colour displays, with gradual blendings controlled by dimmers, has enabled very fine and entertaining results to be obtained both on the stage, the curtains and the scenery. How far the colour effects should be carried is a matter that needs consideration. The surround to the stage may be colour decorative, or it may be decided to distribute colour lighting over all, or a large part of, the auditorium. The captivating results of colour blending in connection with dimmers might well be adapted, in simple form, to general hotel and domestic lighting.

The author was particularly glad to find that at last the British glass manufacturers were roused to produce glasses that competed with, and even excelled, the beautiful illuminating ware hitherto only obtainable from abroad. The supply by at least one manufacturer in this country of "flashed opal" glass, in many shades, had opened up possibilities in conjunction with sand-blasting which would, with the help of competent decorative designers, originate interesting and pleasing luminaries likely to take a prominent part in future lighting schemes.

The "double-purpose" floor standard, which simultaneously floodlights the ceiling while projecting downwards or through a shade a tinted light, is justifiably coming to the fore. Its flexibility of position enables the lighting to be adapted to alterations in furnishing and the fact of either the floodlighting or the direct lighting being available, individually or combined, is an advantage.

The author stressed the necessity of rendering all the light-sources things of appropriate beauty and placing them in situations that give a motif for their existence and of eliminating to the utmost "bright point" effect. He expressed the view that tubular lighting had before it an enormous field of application for interiors as well as exteriors. In this connection he advocated larger diameter of the Neon or other luminous tubes. A comprehensive series of lantern slides of installations, including the New Victoria Cinema, the Gaumont "Palaces" at Hammersmith, Redditch, Salisbury, etc., Claridge's Hotel, and many other places illustrated the lecturer's remarks.

The final discourse, by Mr. J. E. Butterworth, was entitled "Efficiency and Imagination: the Vital Factors for Success." The author claimed that imagination was the inspiration of all true art while efficiency was a matter of technique. Yet both qualities were necessary for success.

Men's minds were now seeking for better ways, their imaginations were being urged to new researches to the end that their service might be more efficient. Almost daily new developments were occurring and new processes in manufacture, design and application were being introduced and public appreciation and taste was improving. Decorators were never so well equipped as they were to-day to secure economic and accurate results. When the importance of imagination and efficiency as factors for success was realized it would be seen that their calling was not merely an occupation and a means of living, but a splendid public service having for its ideal and objective the making lovely of the dwelling-places of mankind.

Literature on Lighting

(Abstracts of recent articles on Illumination and Photometry in the Technical Press)

(*Continued from Page 201, August*, 1932).

Abstracts are classified under the following headings: I, Radiation and General Physics; II, Photometry; III, Sources of Light; IV, Lighting Equipment; V, Applications of Light; VI, Miscellaneous. The following, whose initials appear under the items for which they were responsible, have already assisted in the compilation of abstracts: Miss E. S. Barclay-Smith, Mr. W. Barnett, Mr. S. S. Beggs, Mr. F. J. C. Brookes, Mr. H. Buckley, Mr. L. J. Collier, Mr. H. M. Cotterill, Mr. J. S. Dow, Dr. S. English, Dr. T. H. Harrison, Mr. C. A. Morton, Mr. G. S. Robinson, Mr. J. M. Waldram, Mr. W. C. M. Whittle and Mr. G. H. Wilson. Abstracts cover the month preceding the date of publication. When desired by readers we will gladly endeavour to obtain copies of journals containing any articles abstracted and will supply them at cost.—ED.

I.—RADIATION AND GENERAL PHYSICS.

203. On the Variations of Atmospheric Absorption. G. Rougier.

Comptes Rendus, 195, *pp.* 363-365. *Aug. 1st*, 1932.

Observations have been made at the observatories at Strasbourg and at Sanary in connection with moonlight illumination. In a sky apparently clear a slow variation has been noted, as well as rapid fluctuations, the transparency steadily increasing for a period sometimes as long as two hours after the disappearance of visible cloud, and steadily decreasing for a similar period before the appearance of visible cloud. The application of a mean figure to work extending over a period may introduce considerable error, and should be avoided in accurate work. Details are given of the observations made. S. S. B.

204. A Method of Spectro-photometric Standardization of Electric Discharge Lamps with Line Spectra. L. S. Ornstein and H. C. Burger.

Zeits f. Phys, 76, *pp.* 777-779, *July*, 1932.

The numerous advantages for spectro-photometry of discharge-tube lamps with discontinuous spectra over ordinary electric lamps with continuous spectra are discussed and a method of calibrating the discontinuous source is explained. A monochromator and a thermopile are used, but for lines not too close together filters may be used with advantage. A helium Geissler tube with a thermionic cathode is recommended and filters of Schott filter glasses or of inorganic liquids. T. H. H.

205. The Luminosity of a Flame containing Sodium Vapour. T. Bonner.

Phys. Rev., 40, *No.* 1, *pp.* 105-111, *April*, 1932.

The author describes experiments on the variation of the luminosity of a sodium flame with the flame thickness and with the concentration of the sodium salt sprayed into it. A special type of spray is used. It appears that the luminosity is a function of the product of the thickness of the flame and of the concentration of the sodium in it, or of the mass of sodium per square centimetre. L. J. C.

206. The Photo-electric Properties of Films of Beryllium, Aluminium, Magnesium and Thallium. H. de Laszlo.

Phil. Mag., *No.* 88, *Vol.* 13, *pp.* 1171-1178, *June*, 1932.

The photo-electric properties of opaque films formed by the evaporation of these metals in a high vacuum on to a previously degassed surface were studied in monochromatic light. Measurements were made of the photo-electric response in coulombs per erg and also in electrons per quantum, and the variation of these quantities with wavelength was examined. Magnesium was found suitable for use in photo-electric cells for measurements in the ultra-violet region. L. J. C.

207. The Cathode Projection of Metals and the Transmission and Reflection Factors of the Projected Deposits. A. de Gramont.

Revue d'Optique, *No.* 3, *pp.* 105-114, *March*, 1932.

The object of this work was to explore the possibility of obtaining semi-transparent deposits of various metals in glass, more stable than the deposit of silver usually adopted and suitable for use in the manufacture of reflecting apparatus. The metals investigated included chromium, cadmium, nickel, tin, lead, bismuth, rhodium, palladium and iridium. Deposits were obtained in rarefied air, hydrogen and argon, and were subsequently studied when illuminated by ordinary white light. Although none of the metals examined possessed a reflecting power equal to that of silver for a given transmission factor, some of them possessed a greater stability with regard to atmospheric conditions. L. J. C.

II.—PHOTOMETRY.

208. The Development of Commercial Photo-electric Photometers. G. T. Winch and C. T. Harper.

G.E.C. Journal, III, *pp.* 149-156, *August*, 1932.

The development of photo-electric photometers and the commercial accuracy attainable are discussed and a type of portable photo-electric photometer is described in detail. Various designs of practical photometers are illustrated, and a motor generator of special design for furnishing an electric supply for testing purposes is described. C. A. M.

209. Further Experience of Sperrschicht Cells. A. Dresler.

Licht u. Lampe, 14, *p.* 211, 1932.

A further account of lamp and illumination photometry with rectifier cells. The author deals in some detail with the factors influencing the performance of the cell. E. S. B-S.

210. On the Response of a Gasfilled Photo-electric Cell to Sudden Illumination. P. Fourmarrier.

Comptes Rendus, 195, *pp.* 378-380, *Aug. 1st*, 1932.

Potassium and caesium cells with neon, argon or helium gas-filling have been examined. The current obtained consists of two parts, one that is established immediately and a second that builds up slowly. Various conclusions deduced from the experiments are stated. S. S. B.

211. Wedge Spectrograms without an Absorption Wedge. Oran E. Millar.

Brit. J. Photog., *Vol. LXXIX*, *No.* 3763, *pp.* 366-369, *June 17th*, 1932.

A rotating diaphragm, conforming to a logarithmic curve, is used in conjunction with an optical condensing device to give a known variation of intensity along the spectrometer slit. Qualitative measurements of the spectral sensitivity of photographic materials can be made rapidly, and the apparatus may be easily converted into a photographic spectro-photometer. F. J. C. B.

212. The Measurement of Reflection Coefficients for Oblique Incidence. H. E. Becket.

Proc. Phy. Soc., Lond., 44, *pp.* 439-444, *July*, 1932.

A method is described whereby the effect of obliquity of incidence upon the reflection coefficients of certain materials can be examined. The material is spread upon the metal receiver of a thermopile, which, when exposed to radiation from a pointolite and gold film artificial sunlight lamp, yielded an e.m.f. proportional to the absorption coefficient of the surface. Black and white paints and also polished copper were tested. In addition, the reflection coefficient of polished copper was investigated at certain wavelengths and angles of incidence. These results are compared with those obtained from radiation theory. T. H. H.

213. The C.I.E. Colorimetric Standards and their Use. T. Smith and J. Guild.

Trans. Opt. Soc., Vol. XXXIII, No. 3, *pp.* 73-134, 1931-32.

The new international standards, which define a standard observer, three standard illuminants, standard conditions of illumination and viewing opaque specimens, a standard for evaluating the brightness factor of opaque specimens, and a standard trichromatic system for the expression of colour measurements, are stated and their origin explained. F. J. C. B.

III.—SOURCES OF LIGHT.

214. The Tungsten Electric Lamp. W. E. Forsythe and E. M. Watson.

Brit. J. Photog., Vol. LXXIX, No. 3768, *pp.* 445-447, *July 22nd*, 1932.

The paper shows the successive steps by which vacuum and gasfilled tungsten lamps have been rendered more efficient and reliable. It also emphasizes the immense scope still existing for the more efficient conversion of electrical energy into light. F. J. C. B.

215. Gaseous-discharge Lamps are Practical Light Sources. R. D. Mailey.

El. World, 100, *pp.* 44-47, *July 9th*, 1932.

This article discusses various forms of gaseous-discharge lamps, and describes their characteristics and construction. Spectral luminosity diagrams for several gas-fillings are compared with that of sunlight. A table of luminous efficiencies is included. W. C. M. W.

216. On the Progress of Luminous Tubes of Rare Gases. Georges Claude.

Comptes Rendus, 194, *pp.* 2253-57, *June 27th*, 1932.

An account is given of the author's recent work on high-current discharge tubes. The variation of luminous efficiency with pressure of gas is illustrated, the maximum efficiency being attained at approximately 2 mm. pressure. S. S. B.

217. Sodium-vapour Lamp. Anon.

Elec., 109, *p.* 92, *July 15th*, 1932.

A description, with photographs, is given of a sodium-vapour lamp recently developed in Holland, together with details of experimental street-lighting carried out with a number of such lamps. C. A. M.

IV.—LIGHTING EQUIPMENT.

218. Photo-electric Cell Monitors Sign. Anon.

El. World, 100, *p.* 117, *July 23rd*, 1932.

A graph is given showing the times of actuating of a photo-cell-controlled electric sign, and comparing these with the sunrise and sunset times. W. C. M. W.

219. Aeroplane Projectors and Landing Lights. B. Duschnitz.

Licht u. Lampe, 12, *p.* 179, 1932; 13, *p.* 196, 1932; 14, *p.* 214, 1932.

After dealing generally with the conditions necessary for safe landing during night flying the author describes different types of projector made by the leading German firms. He deals first with projectors carried by the aeroplane itself, giving details of those with fixed or movable beams and either attached or built into the body of the aeroplane. The author further describes apparatus for illuminating the landing area from the ground. He gives details of both fixed and portable forms. He finally discusses the advantages offered by the different types and also of centralized and decentralized illumination. E. S. B-S.

V.—APPLICATIONS OF LIGHT.

220. Uniformity of Illumination. K. Norden.

Licht u. Lampe, 15, *p.* 231, 1932.

The author shows by means of graphs how the uniformity of illumination is not necessarily increased by increasing the number of light sources. He takes the illumination of a column or cylinder as a special case. E. S. B-S.

221. Adequate Wiring Assures Full Lighting Value. R. A. Palmer.

El. World, 100, *pp.* 84-5, *July 16th*, 1932.

Describes the lighting of a large departmental stores, and gives values of illumination for the various floors. W. C. M. W.

222. Street Lighting Increased 400 per Cent. G. Robinson.

El. World, 100, *p.* 111, *July 23rd*, 1932.

The street lighting in Boston, U.S.A., has recently been increased by approximately 400 per cent. The lighting of the area centred at the intersection of Charles Street and Cambridge Street (a busy road-junction) is described in detail. A 20-ampère alternating current series system is employed. W. C. M. W.

223. Traffic Lighting Regulations. L. Bloch.

Licht u. Lampe, 15, *p.* 231, 1932.

Such of the new German traffic regulations issued on May 26th, 1932, as apply to lighting are quoted. Changes and new regulations are given in heavy print. Germany has now come into line with the other countries by adopting a red rear light. New regulations also affect the colour of direction indicators, fog lights, and the adjustment of projector lights. E. S. B-S.

224. Bad Train Lighting. Anon.

Elect., 109, *p.* 106, *July 22nd*, 1932.

A comparison is made of values of illumination measured in various electric trains in and around London. Results for the Metropolitan Railway compare very unfavourably with those for the other two railways examined—the Southern and the Underground—and it is shown that they are little better than those obtained from a Piccadilly railway coach 25 years old.

The results also show the marked improvement in illumination in the coaches on the Piccadilly line over this period. C. A. M.

225. Illumination of Lambeth Bridge. Anon.

Elec., 109, *p.* 122, *July 22nd*, 1932.

Particulars are given of the lighting equipment of the new Lambeth Bridge, together with details of spacing, and the resulting illumination. C. A. M.

226. Memorial Lighting. Anon.

Elect., 109, *p.* 151, *July 29th*, 1932.

The floodlighting of the Auckland War Memorial Museum is carried out by floodlight projectors hidden from view in specially designed ornamental lanterns on standards. The Cenotaph in front of the building appears in silhouette. C. A. M.

227. Open-air Theatre. Anon.

Elect., 109, *p.* 206, *Aug. 12th*, 1932.

Particulars, with a photograph, are given of equipment used in the lighting of an open-air theatre at Scarborough. The stage is set on an island in the lake, and excellent opportunities are afforded for coloured floodlighting, which is extensively used. C. A. M.

228. Athletic Field Illumination Promotes Diversified Sports. C. H. Bronner.

El. World, 100, *pp.* 24-5, *July 2nd*, 1932.

The lighting of an American football field at the John Hopkins University is described. A load of 96 kw. is employed, and an illumination of 7 foot-candles is obtained. The ground is used for Association football, polo, and lacrosse, in addition to American football. W. C. M. W.

229. Lighting a Fountain with Changing Colours. Robert B. Ely.

El. Journal, Vol. 29, No. 6, p. 297, June, 1932.

describes the design of a small illuminated fountain having twelve 1,000-watt colour floodlights controlled by automatic motor-driven dimmers. J. M. W.

230. Light and Architecture. Anon.

Am. Illum. Eng. Soc. Trans. 27, pp. 514-532.

After comments on the Society's prize designs, eight illustrated descriptions of new installations are given. G. H. W.

231. Directional Church Lighting. E. Rambush.

Am. Illum. Eng. Soc. Trans., 27, *pp.* 551-563.

A review is given of recent developments in the application of directional light to church interiors, with illustrations of various modern lighting units and installations. G. H. W.

232. Atmospheric Lighting for Special Occasions. W. A. Heth.

Am. Illum. Eng. Soc. Trans., 27, *pp.* 533-549.

Apparatus and schemes for outdoor decorative lighting are described. Methods of obtaining attractive effects are described in detail, with illustrations. G. H. W.

233. Illuminated Fountain, Beverly Hills, California. L. A. Gates.

Am. Illum. Eng. Soc. Trans., 27, *pp.* 566-570.

A short description of this fountain is given, with illustrations of the equipment, and its mounting, and the effect produced. G. H. W.

VI.—MISCELLANEOUS.

234. The Transmission of Light in Diffusing Media. R. J. Hanstock.

Trans. Opt. Soc., Vol. XXXIII, No. 4, pp. 137-149, 1931-32.

The transmission of light by thin films of diffusing material is investigated, a flicker photometer being used for the purpose. An accurate method of measuring the hiding power of such films is described. F. J. C. B.

235. Anomalies of Visual Acuity in Relation to Stimulus Distance. E. Freeman.

J. Opt. Soc. Am., 20, *pp.* 285-292, *May*, 1932.

There is an anomaly of visual acuity which consists of a markedly greater acuity for a large distant constellation than for a small and correspondingly nearer constellation. An attempt to explain this phenomenon was made by a laboratory experiment. The minimum separation of two black lines on an illuminated background was found both at 300 cm. and 30 cm. distance, the dimensions being appropriately adjusted. Also the minimum width of a slit for perception of it was also found for these distances. It was found that acuities measured in both these ways were greater for a stimulus at 300 cm. than for one at 30 cm.

It was found that this incongruity was due neither to (1) psychological factors, (2) differences in width of pupil of the eye, or (3) differences in lenticular thickness arising from accommodation.

The effect occurred with light-adaption as well as dark-adaption of the eye, and no explanation is offered. T. H. H.

236. Some Remarks on the Comparison of the Light Diffused by and the Light Transmitted by a Diffusing Media. A. Bontaric.

Rev. d'Optique, No. 4, p. 145, *April*, 1932.

Numerous pieces of apparatus designated variously as Nephelemeters or Tyndallmeters yield interesting information of a qualitative nature regarding the evolution of suspensions or colloidal solutions from a study of the light-diffusing properties of the latter. Theoretical considerations, however, show that the numerical results they give are by no means capable of a simple interpretation. The authors describe experiments made with suspensions of gum mastic. From these experiments they have been able to establish a curve relating the optical density of the medium to the intensity of the light diffused perpendicularly to the incident beam. The experimental and theoretically deduced values are in good agreement. L. J. C.

237. The Hiding Power of Diffusing Media. T. Smith.

Trans. Opt. Soc., Vol. XXXIII, pp. 150-158, 1931-32.

From theoretical considerations an expression is constructed as a numerical measure of the power of a sheet of diffusing medium to hide the brightness contrasts of a surface on which it falls. F. J. C. B.

The Lighting of Hotels

The Lighting of Hotels, which is to form the subject of the combined E.D.A.-E.L.M.A. campaign this autumn, offers a fine field for propaganda. There are about 9,000 hotels in the United Kingdom, and few of these can be considered quite satisfactorily lighted. Points to be specially noted in the campaign are: Better lighting in public rooms, more convenient lighting in bedrooms, adequate lighting in kitchens, architectural lighting in ballrooms, lounges, etc., luminous indicator signs in corridors, outside electric signs, lighted canopies, and exterior lighting. Some of these forms of lighting could perhaps only be expected in the case of relatively large hotels, but in other cases, e.g., as regards the lighting of bedrooms and kitchens, there is probably scope for improvement in almost every hotel on the list. The method of approaching this big list of hotels has been worked out with care, and we shall be surprised if the results of this campaign do not prove highly encouraging.

A Review of Illuminating Engineering in Malaya

By AN ENGINEERING CORRESPONDENT

FIG. 1.—Floodlighting of the Singapore Municipal Offices during the Manufacturers' Exhibition (1932).

LIGHTING in British Malaya is, in many respects, considerably below the standards of Europe, but undoubtedly progress in recent years has been retarded by the world-wide economic depression which has been felt so severely in this country.

Generally speaking, normal English practice is followed and most of the equipment installed is British, though quite a number of Continental fittings are seen.

The population is a very mixed one with a comparatively small proportion of Europeans. The Asiatics are as yet but little educated in the ways of good lighting, and this fact, coupled with their decreased purchasing power, accounts for some very inadequate installations. It is chiefly to the European public bodies and most of the architects that the illuminating engineer can look for encouragement in promoting better lighting conditions.

He is, however, faced with many problems which are peculiar to tropical conditions, and a few examples can be cited. In the design of lighting equipment, the ingress of the myriads of flies and insects has to be guarded against, and totally enclosed street lanterns are therefore invaluable in this respect. Again, floodlights and lanterns which are thoroughly satisfactory in England may be quite inadequate in keeping out the torrential rains experienced here, and special baffles may have to be provided. Many well-planned interior schemes may be upset by ceiling fans having to be interspaced with the fittings, and also precautions must be taken to avoid the annoying shadow-flicker apt to be cast by the fan blades.

Perhaps the most difficult problem to be faced, however, is a quality in the atmosphere in some parts of the country which affects various kinds of glassware in different ways. Prismatic glass refractors, the moulded glass of some decorative fittings, and also opal diffusing globes have been known to disintegrate suddenly and fall to pieces. In a certain locality it has the effect of turning the coloured glassware of some decorative fittings a shiny black colour and also causes the colouring to fade away altogether.

Floodlighting.—There are very few examples of "decorative" floodlighting on a permanent basis. The Kuala Lumpur War Memorial is perhaps one of the best installations, four "Olympia" type 1,000-watt units being used recessed into the stonework of the base. For utilitarian purposes, however, floodlighting is largely used. Thus there are large numbers of projectors employed in tin mines and for excavating work. Other popular uses for floodlights are for poster lighting and also for swimming pools, thus enabling bathing to be enjoyed after nightfall, which occurs all the year round about 6-30 p.m.

During the recent Singapore Manufacturers' Exhibition three large buildings were floodlit, including the Municipal Offices, a photograph of which is shown.

Industrial Lighting.—There are very few well-planned factory installations, and it is a common experience to find small conical iron shades with bare lamps suspended in a haphazard fashion. Most of the factory engineers are Chinese who cannot be made to realize the advantages to be gained from a well-planned scheme, and this, coupled with the necessary expenditure of new equipment, usually prevents any improvements being carried out.

Domestic Lighting.—There are many fine installations to be found in houses and bungalows, the European

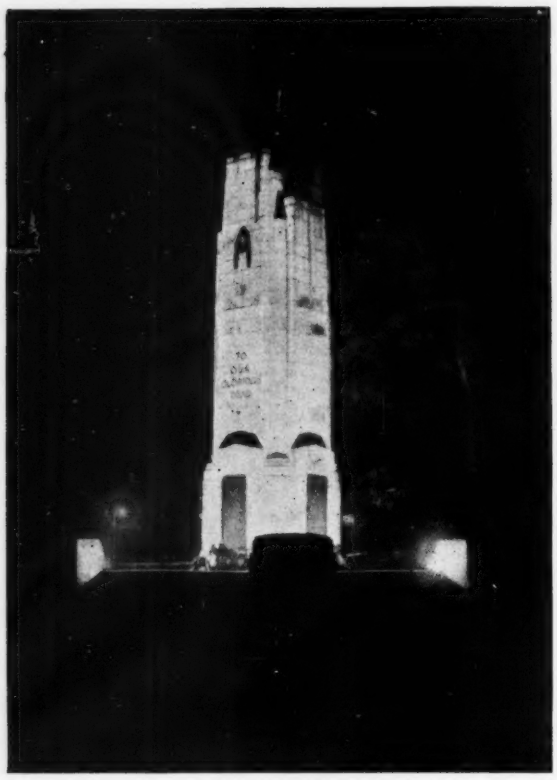


FIG. 2.—The Kuala Lumpur War Memorial.

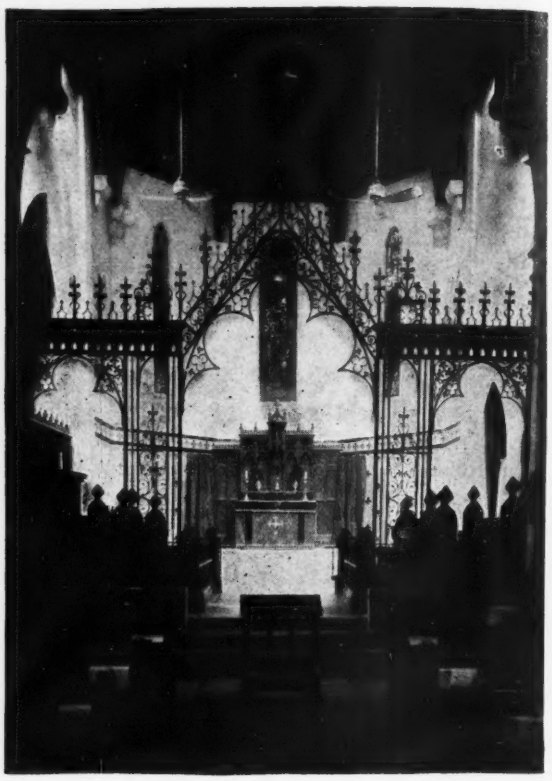


FIG. 3.—Floodlighting of St. Mary's Church, Kuala Lumpur.

community favouring " modern style " fittings. There is also an electrical showroom in Singapore, which is well equipped with every kind of fixture and also embodies a number of architectural lighting features.

Most of the Chinese population are more conservative and still prefer metal electroliers, particularly if the design embodies plenty of scroll work, etc., and they also favour glass electroliers of elaborate design and many colours. Architectural lighting has gained but little ground so far, but there are a few good installations to be found and a difficulty is in the cutting and fitting of glass panels on site. Indirect lighting schemes carried out from the cornice can be seen, but few of these have been well planned, and in some cases the results are truly appalling with the lamps placed many feet apart and sometimes with the filaments completely exposed.

Glass covers should be provided to keep out insects as much as possible and frequent cleaning is essential.

Church Lighting.—Most of the lighting schemes in churches are old-fashioned, and the effective method of concealed floodlighting is almost non-existent. There is, however, one good example, which was carried out with Gecoray reflectors, it being in St. Mary's Church, Kuala Lumpur, F.M.S.

Signs.—Electric advertising is fairly popular, but there are no large animated signs as can be seen in Piccadilly Circus, etc.; box signs are the most usual, and they are usually made locally by Chinese workmen. In Singapore there are a number of locally assembled luminous tube signs installed which meet with a fair measure of success, and some quite striking colour arrangements can be seen.

Shops and Offices.—Standard practice is widely adopted, and the popular diffusing globe unit is usually installed in the better-class shops, but the smaller concerns run by Asiatics still adhere to glass shades and glaring lamps.

It is of interest to note that daylight blue lamps are often used in the hope of decreasing the number of insects which are attracted to all sources of light.

Shop-window reflectors are not very popular except in the automobile showrooms, and some of the displays employing colour screens are very striking.

FIG. 4.—An Electrical Showroom in Singapore.

Street Lighting.—Municipal electrical departments are fully alive to the possibilities of good street lighting, and well-planned schemes are gradually being adopted. Big strides are being made in the rural areas of Singapore, and many miles of coast road have recently been illuminated by 200-watt Wembley lanterns with asymmetric refractors. They are centrally suspended from span wires, the supply being overhead, and the results are notable for the very even illumination on the road surface. This system has been adopted as far as possible as a standard arrangement in Singapore, and in the near future extensions are to be made.

Ornamental standards with opal glass diffusing globes are popular throughout this country, and they

FIG. 5.—A Wing Flood being delivered to a client in typically Oriental manner.

FIG. 6.—An original fitting in use in the roof-garden of a popular club.

have been adopted in many streets in residential areas and look very handsome.

Gas systems are extensive and many miles of streets are so lit, and it is of interest to note that concrete columns are widely used. These are cast locally and are not of very ornamental design.

Many experiments have been carried out recently in Singapore with a view to ascertaining the best method of illuminating policemen on point duty; amongst the devices adopted are narrow-angle deep-skirted silvered glass units and also four-way bi-multi fittings, in each case suspended immediately over the policeman and fitted with 500-watt lamps. The policemen, who, of course, are Asiatics, are usually dressed in white uniforms at night and are assisted by a wicker-work cross-arm some 5 ft. long which is strapped to their backs. Illuminated by the above methods they are readily visible.

An automatic traffic signal has been installed with considerable success in Singapore, and it is hoped that this system will be extended. It is a three-aspect four-way signal placed in the centre of the cross-roads, and the traffic control worked very smoothly once the Asiatic drivers became accustomed to it, although some still regard it with a certain amount of awe.

Theatres and Cinemas.—There are very few legitimate theatres in the country but, of course, cinemas are extremely popular. Some of these have up-to-date stage lighting equipment installed with the usual floodlights, battens, etc. Effect projectors providing colour-changing patterns on the screen are popular and appeal very much to the Chinese community. One or two cinemas have adopted indirect lighting in their interior schemes, but generally speaking electroliers and bowl fittings are more usual. One cinema is illuminated by means of large enclosed pendant fittings glazed with rain-drop glass, each housing 24 100-watt lamps in four colours. Each colour is controlled by a separate hand-operated dimmer and numerous colour combinations can be obtained.

The accompanying photograph (Fig. 5) is rather amusing and shows a wing flood being delivered to a client in typically Oriental fashion.

Two installations recently carried out in Singapore are of interest, but of widely different nature. One is the roof garden of a popular club (Fig. 6). The standards, which were designed and made locally of concrete, embody totally indirect lighting, each standard housing four 60-watt lamps protected by glass covers immediately below the reflector portion. These standards have the merit of being novel and in keeping with their surroundings, inexpensive to make up, fully weatherproof and adequate in their light output.

The other installation is the new terminal station for the F.M.S. Railways which has just been opened. This has an up-to-date electrical installation throughout. It is too extensive to describe in detail, but the following points are of interest:—

The illumination of the goods yards and sidings, etc., received much forethought. The relative merits of floodlighting from high towers or a "local" scheme using lanterns on columns were carefully considered. It was eventually decided to adopt the latter chiefly owing to lower installation costs, and 500-watt Wembley lanterns with asymmetric refractors mounted some 30 ft. high and 160 ft. apart have been installed and give excellent results.

The locomotive fuelling stages are floodlit by 500-watt wide-beam projectors mounted on 30 ft. poles.

The platforms are illuminated by 100-watt dispersive reflectors at 30 ft. centres.

The carriage shed and engine sheds have a combined system of overhead lighting and side lighting. The former is carried out by dispersive reflectors and the latter by elliptical angle reflectors housing 100-watt Pearl lamps in each case. It has been found that work can be carried out after dark quite as easily as during daylight hours.

There is a complete installation of up-to-date colour-light signals for the tracks, and the whole of the exterior equipment is of a very high standard.

In the main hall a large number of locally made box signs are employed, and the main illumination is carried out by means of large rectangular fittings hung on rods, each housing ten 100-watt lamps.

Notice boards are lit by silvered-glass reflectors, and there are two laylights glazed with white diffusing glass with 60-watt dispersive reflectors above.

H. D. C.

[We desire to record our indebtedness to the courtesy of The General Electric Co. Ltd., who have furnished blocks of the various illustrations sent by our correspondents.—ED.]

The Lighting of the Commonwealth Buildings

With special reference to the Parliament House, Canberra

By AN ENGINEERING CORRESPONDENT

IT is perhaps not generally recognized that the Commonwealth has recently carried out a considerable amount of important building work. The following list will give some idea of the nature of these buildings, involving interesting schemes of lighting: The Parliament House, the Australian Institute of Anatomy at Canberra, the McMaster Laboratory, Bank Buildings at Brisbane, Perth, and the Head Office of the Bank at Sydney. All these buildings, and likewise the "East-West Air Route," called for special up-to-date lighting.

In dealing with such large buildings one finds one's self confronted with one main problem almost immediately—namely, the difficulty experienced in ascertaining how the areas to be lighted are to be used, that is to say, whether each occupant is to have a water-tight compartment to himself or whether he is to share the space with a number of other human units. This problem is, of course, met in all large buildings, and is not confined to Government buildings only.

Another problem is the reconciliation of engineering requirements with the architectural features of the building. In some cases much thought and experiment are involved. In the case of Parliament House at Canberra, for instance, it was felt that direct lighting was out of the question, because the positions assumed at times by members made it practically impossible to avoid light entering their eyes at the "hypnotic angle."

Semi-indirect lighting with bright bowls was likewise regarded as unacceptable, and ultimately totally indirect lighting was adopted. An Australian writer* in a colloquil manner remarks:—

"We therefore drew out our slide-rules, did some guessing, collected some bits of three-ply and cardboard from the scrap heap, rummaged in the paint shop for scraps of glass, and built up some models to try and get the best architectural effect. Fittings were made up in this way and suspended by ropes, so that the architects could see what we intended to do. Five fittings, each having two separate circuits of 1,000 watts each, were finally installed, and the illumination is all that could be desired."

The Senate Chamber and the House of Representatives appear to be filled with a golden glow of light, free from shadows, and without glare when all circuits are in use. On account of the height of the two chambers, it was impossible to install new lamps or clean the fittings without scaffolding of some description. Each unit is accordingly carried by a small hand-operated winch placed above the ceiling, so that it can be lowered and raised. Each winch operates in conjunction with three-way contactors, so that as the fitting is lowered the two circuits are broken.

The King's Hall and corridors off it are lighted with similar fittings but of smaller diameter, and with shorter suspensions. The Library presented a number of problems; provision had to be made for good general lighting; lights had to be provided over large chairs here and there, and for special local lighting of reading tables in alcoves. A special wall-bracket fitting furnishing local lighting over the large chairs was designed. This consists of a wooden shade painted white inside and out, and carried by a bronze base with curved arms. Less important corridors are lighted by Westinghouse "Sollux" fittings, while covered ways and the large external lights are of Australian glassware.

In the dining-room and lounge are installed totally indirect fittings made of Australian blackwood with the silvered-glass reflectors, mounted inside and suspended by four vertical chains.

The billiard tables are lighted by means of three-light fittings. These are made up of square brass tubing and carry green shades covering white reflectors.

The most recently completed building at Canberra is the Australian Institute of Anatomy. This consists of two large "Museum" sections, with library and a very fine lecture-hall. This building is somewhat different from the conventional type of public buildings. One of the principal aims of the architect was the imitation of purely Australian forms; the ornaments on the decorated caps of the columns in front are iguanas, while the ornaments round entrance doors are bearded lizards with wide-open mouths. The boomerang is used throughout as a decorative feature, and the platypus figures in the glass ceiling of the entrance hall.

Each of the main museums is lighted by six leadlight suspension units, and somewhat similar fittings are used in the lecture theatre. (The last-mentioned, by the way, is built without windows.)

The library and entrance hall are lighted by lamps concealed above the glass ceiling, the light being reflected from a white surface, and in the case of the entrance hall also four leadlight fittings are mounted under the balcony to illuminate sculptured heads of men noted in medical science. Lighting around the quadrangle colonnade is provided for by amber-coloured glass fittings mounted on the inside of the column. The corridors are lighted by means of B.G.E. type totally enclosed opal glass units, which suit the general lines admirably.

The problem of lighting over ceilings to give a daylight effect came up several times, and the following table, which shows results of tests made by the Department of Works on different kinds of glass, may be of interest:—

Description of glass.	Percentage of light transmitted through glass:— Rough side towards light.		Smooth side towards light.
Clear glass	100	...	100
Raised cathedral glass (clear)	90	...	97
Pin-head glass (clear)	90	...	93
Morocco glass (clear)	83	...	83
Plate glass acided one side	90	...	90
,, ground one side	70	...	70
,, stippled one side	80	...	60

These results point to the necessity of giving a certain amount of consideration to the choice of glass for windows or glass ceilings. (The writer acknowledges his indebtedness to the *Australian Engineer* for the details given in the above.)

W. J. L.

* The *Australian Engineer* (Sydney).

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The Lighting of Sydney Harbour Bridge

WE are indebted to Messrs. Holophane Ltd. for the accompanying pleasing views of the great Sydney Harbour Bridge—the wonderful bridge completed early in the present year, which is stated to be the largest in the world. It may be recalled that the length of the bridge is 3,770 feet, the width 160 feet, and the height of the arch 437 feet. Fig. 1 gives an impressive view of the complex steelwork and Fig. 2 a view looking across the southern approach to the bridge at night. The lanterns on either side of the roadway (a close view of which is seen in Fig. 3) show up well, and have a dignified effect.

A very spectacular view of the bridge as seen from a distance appears in Fig. 5. This illustrates very clearly the spectacular value of light in revealing a

FIG. 3.—View of road approach looking towards north side, showing lantern, post type, equipped with Holophane 2/4433 Refractors and 750-watt gasfilled lamps. 120-ft. spacing, 23 ft. high.

bridge at night; one might almost say that effective lighting of a bridge, apart from its utilitarian value, is justified from this standpoint alone. (One can recall many bridges, naturally on a far smaller scale, in this country the lighting of which would repay study; the finely situated bridge across the Tyne, connecting Newcastle and Gateshead, is a typical case in which more effort at spectacular treatment would surely be justified.)

Our other pictures (Figs. 4 and 6) relate to the lighting of the Wynward Station on Sydney's underground railway, and this too presents interesting features. It will be observed that the arrangements in no wise fall behind those on our London tube railways (which indeed they appear to resemble). The use of illuminated destination signs on the platform (Fig. 6) will be noted, and likewise the assembly of the industrial type reflectors at a high level, leaving a clear view down the station platform. The adoption of Holophane prismatic glass for the illumination of the escalator platform

FIG. 1.—View of Steelwork, taken from centre of bridge.

FIG. 2.—Southern approach of bridge. View taken at night. General illumination by 280 cast-iron Octagonal Lanterns equipped with Holophane Refractors 2/4438 on footways. Each lantern using 300-watt gasfilled lamp. Spacing 60 ft., mounting height, 22 ft. 6 in.

(Fig. 4) is, we believe, something new. Judging by the photograph, it appears to be highly effective.

Detailed particulars of the lighting equipment (for which we are also indebted to Messrs. Holophane Ltd.) appear under the various illustrations.

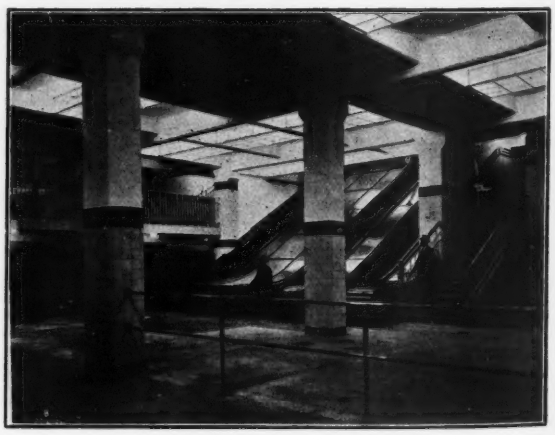

FIG. 4.—Wynward Station Escalator Platform, equipped with Holophane prismatic glass.

A Deal in Searchlights

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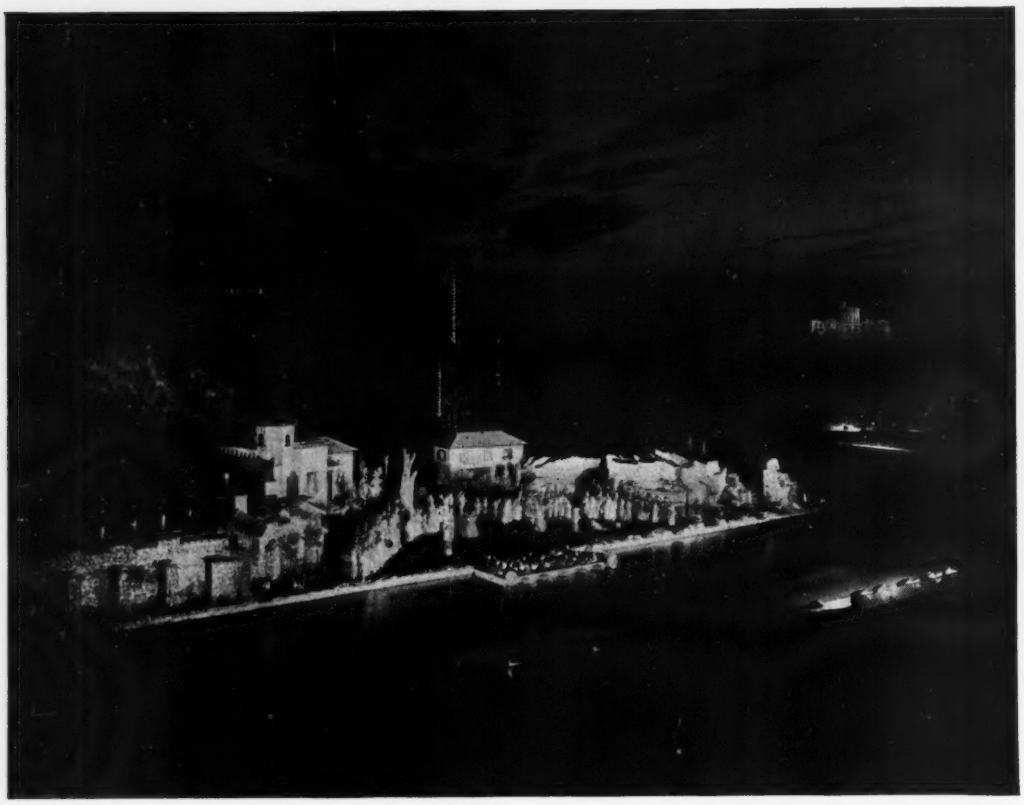
FIG. 5.—Night view of Sydney Harbour Bridge. General illumination by 280 cast-iron octagonal lanterns, equipped with Holophane 2/4438 Refructors in footway units. Each lantern using 300-watt gasfilled lamp. Spacing 60 ft., mounting height 22 ft. 6 in.

FIG. 6.—Wynward Station Platform. Holophane Industrial-type Reflectors AF.150, with 150-watt clear gasfilled lamps.

The Lighting of Scarborough's Open-Air Theatre



A General View showing the striking effect of the Floodlighting by Night. The illuminated Windsor Castle may be seen in the distance.

The new Peasholm open-air theatre, which was opened by Sir Maurice Jenks on July 28th, is a highly interesting venture—well deserving the patronage of the Lord Mayor, who arrived in his famous state-coach, brought from London for the occasion. This new open-air theatre is set amidst rugged surroundings, in the vicinity of Scarborough. An almost hidden and yet spacious valley in the cliffs at Peasholm has been transformed into a fine arena in which famous plays are performed in the open air before large audiences. It is the largest venture of its kind in Britain, and is claimed to be the first to be completely successful. This is attributed to two conditions—the excellent natural acoustics of this valley amid the cliffs and the skilful application of the microphone. On the occasion of the Lord Mayor's visit Sir Edward German's opera " Merrie England " was performed.

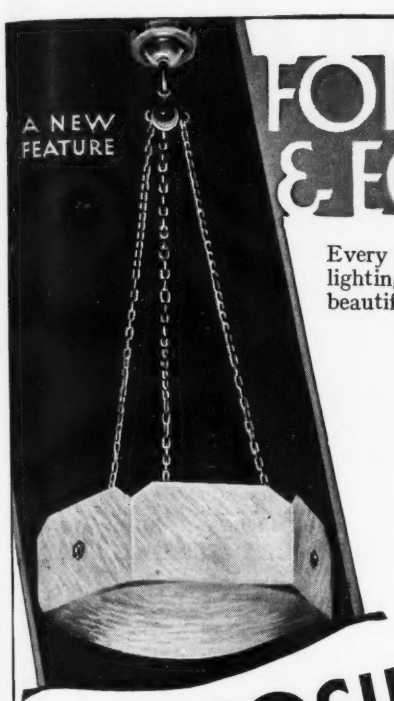
The site is peculiar. A vast lake lay in a beautiful valley with an island in the centre. The island is the stage, and access to it is by a footbridge from the mainland. On the island stage effects are erected, and immediately opposite is a grand natural-tiered auditorium capable of seating 6,000 people already, and large enough to accommodate 10,000 people if required. On the outskirts of the woods stands " Windsor Castle," from whence pikemen, beef-eaters, trumpeters, lords, oarsmen and boatmen descend by a tortuous pathway to the edge of the lake, thence across the footbridge to " Merrie England," with its 250 performers. The lake for the moment takes on the mantle of the River Thames, and on it floats majestically a replica of the State barge of Good Queen Bess, propelled by oarsmen of the period. Such is the theatre, such is the play—and London's own Lord Mayor in the flesh was brought into the picture.

It need scarcely be said that the success of this enterprising new venture—on which some £60,000 has been expended—depends in a great measure on the skilful use of artificial light. The illumination is effected by a multitude of cleverly concealed projectors, hidden in flower-beds or behind rocks, etc. The success of the arrangements is due to Mr. E. J. Jarvis, the Borough Electrical Engineer, and his staff, who, in collaboration with the Illuminating Engineering Department of the General Electric Co. Ltd., prepared the scheme.

The main frontal lighting for illuminating the island stage consists of a bank of twelve triple-lamped floodlighting units of entirely new design. Each of these is equipped with three 1,000-watt Osram lamps, while colour screens are fitted to introduce hue and tint. This lighting is augmented by numerous other floods. A G.E.C. switchboard and dimmer control causes the lighting to fade into the softness of gradations. All around are electric lamps arranged for subsidiary lighting purposes. Over the auditorium powerful Wembley lanterns are installed, illuminating the vast audience in a very effective manner.

The opening performance was given by the Scarborough Operatic and Dramatic Society on July 28th, and is to be repeated twice weekly until September.

Whilst the above is certainly an outstanding installation, there have been other cases of effective spectacular lighting out-of-doors during the past month. For once in a way, too, the fine weather has served as an incentive to artificial lighting, which has been used at many seaside resorts and bathing-places during fine and warm evenings. The spell of hot weather did materially influence the national habits, and its effect in encouraging people to spend the evenings out-of-doors more freely may well be permanent.



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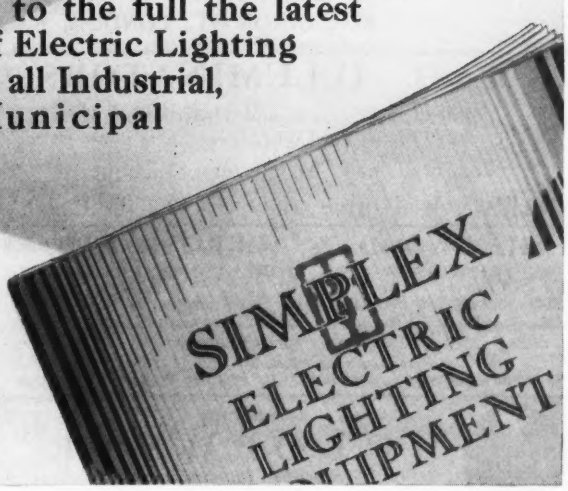

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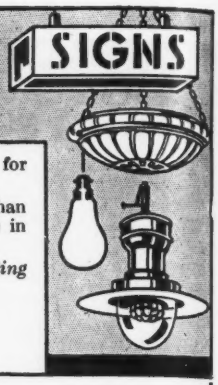

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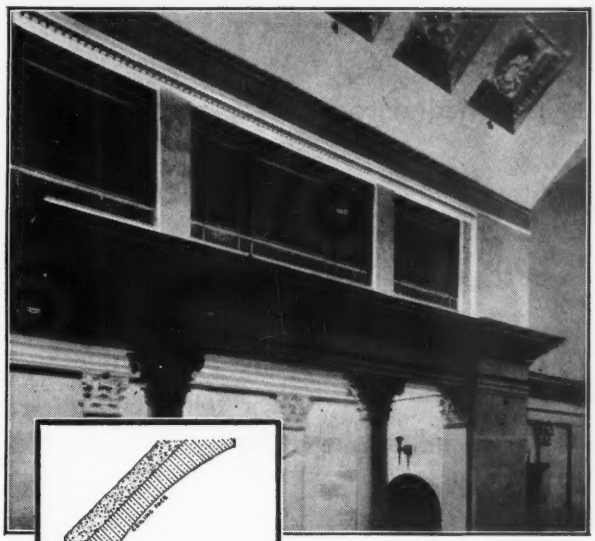

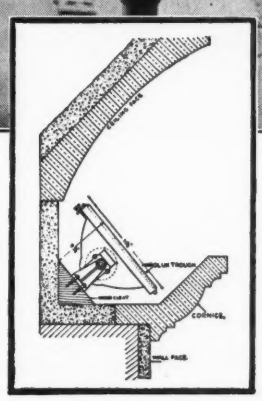

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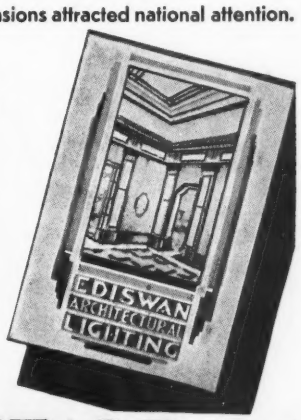
Whatever your particular lighting problem, and wherever you are situated, there is a competent Ediswan lighting engineer ready to lend his experience and help. Ediswan engineers have been responsible for some of the finest lighting installations in the country; planning, supervising and collaborating to produce the effects which have on many occasions attracted national attention.

Ediswan Lighting Service is offered entirely free and without obligation to all architects, contractors and commercial undertakings wishing to employ good lighting.



Every architect and contractor should have this book. It contains a wealth of information and will be sent on receipt of a post-card.

EDISWAN
ARCHITECTURAL LIGHTING

THE EDISON SWAN ELECTRIC CO. LTD.
Commercial Lighting Department
155 CHARING CROSS ROAD, LONDON, W.C.2

SPECIALISTS IN THE NEW ARCHITECTURAL LIGHTING

LA121

RADIOVISOR PARENT LTD.

beg to announce that they will be exhibiting their Latest Models of the Radiovisor Lighting Unit on Stand No. 18 at the **Exhibition** at the Conference of the **Association of Public Lighting Engineers,** to be held at the Imperial Hydro Hotel, **Blackpool,** commencing September 5th, 1932.

The Wolf Safety Lamp Co. 19
(WM. MAURICE) LTD.
SOUTH STREET, PARK, SHEFFIELD
Specialists in ELECTRIC HAND LAMPS with Wolf Alkaline accumulators for Mines, Railways, and General Purposes.
ACETYLENE LAMPS (150 models).

Credalux
Industrial, Commercial & Street Lighting Shopwindow
REFLECTOR FITTINGS
SCIENTIFICALLY DESIGNED
CREDENDA CONDUITS CO. LTD., OLDBURY, BIRMINGHAM.

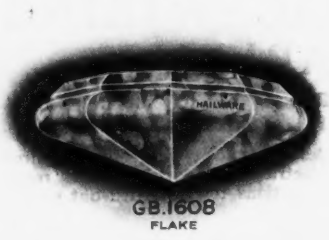
Street Lighting ... automatic control with negligible maintenance!
Particulars of "Contactor System" from
BROOKHIRST SWITCHGEAR LTD., — CHESTER.

A notable event on Friday, July 29th, was the visit to the premises of Holophane Ltd. of His Royal Highness Prince George, who spent nearly three-quarters of an hour in the demonstration theatre witnessing the now familiar colour-lighting display, supplemented by dancing and singing. As is well known, His Royal Highness has been studying industrial working conditions, and he was therefore keenly interested in the display of industrial lighting, as well as the new hospital lighting equipment, both of which were examined in the course of a tour of the building. At the conclusion of his visit His Royal Highness accepted the Directors' invitation to luncheon.

In the photograph reproduced above are seen, in the front row (left to right), Lord Ernest Hamilton, H.R.H. Prince George, Mr. H. Hepworth Thompson (Managing Director), the Rt. Hon. Lord Fairfax and Major Robert Woodhouse.

Hailware Flake Bowls

We have received from Messrs. Hailwood & Ackroyd Ltd. some leaflets illustrating a new development—the introduction of "Hailflake" shades and bowls, which are available in a considerable variety of pleasing forms. These standard types are supplied in white, coloured or alabaster glass, and flakes can be furnished in the following colours: Rose, rose and white, green, light gold, and deep gold. We may add that glassware of this type suitable for gas lighting is being listed.



This is yet another instance of the variety of designs which Messrs. Hailwood & Ackroyd have been recently placing on the market, and admittedly at very reasonable prices.

Visit to Shakespeare Memorial Theatre, Stratford-on-Avon

Tuesday, October 18, 1932

Members and friends desiring to take part in the interesting visit should at once inform the Secretary of the Illuminating Engineering Society (Mr. J. S. Dow, 32, Victoria Street, London, S.W.1), from whom the necessary badges and vouchers for railway tickets may be obtained.